CLAIMS

What is claimed is:

1. A method for messaging within a plurality of nodes, wherein each of the nodes includes a processor, a memory connected with the processor, and a directional communication interface, the method comprising:

   a. receiving a message including an address code and corresponding data at a current node among the plurality of nodes, the address code including a relative target address of the node to which the corresponding message is intended to be sent;

   b. processing the received address code to determine if the address code indicates that the current node is the intended recipient of the message;

   c. modifying the message based on the direction from which the message was received, the address code in the message, and the direction to which the message is to be re-transmitted;

   d. re-transmitting the message including the modified address code, in each direction in which it is to be re-transmitted; and

   e. repeating steps a to d at every node until the message reaches the node to which the message is intended to be sent, whereby a message may be propagated across a plurality of nodes along multiple paths until the message reaches a desired recipient, thereby providing path redundancy without the need for the use of unique node identities.

2. A method for messaging within a plurality of nodes as set forth in claim 1, further comprising a step of expiring the message to prevent its re-transmission .

3. A method for messaging within a plurality of nodes as set forth in claim 1, further including a step of time-stamping the message when it is initially transmitted, and a step of comparing the time-stamp to a current time at each node prior to re-transmission, a step of halting the re-transmitting of the message after a predetermined amount of time has elapsed since the step of time-stamping the message occurred, whereby a messages propagate through the plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

4. A method for messaging within a plurality of nodes as set forth in claim 1, further including a step of initializing a cumulative hop count in the message when it is initially transmitted, a step of incrementing or decrementing the hop-count each time the message is re-transmitted, and a step of halting the re-transmission of the message when the hop-count reaches a predetermined level, whereby messages propagate through the plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

5. A method for messaging within a plurality of nodes as set forth in claim 1, further including a step of providing a unique identifier the message when it is initially

transmitted, a step of checking and recording the unique identifier of the message at each node to determine whether the unique identifier of the message matches one previously stored, and a step of halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through the plurality of nodes only once.

6. A method for messaging within a plurality of nodes as set forth in claim 1, wherein multiple nodes among the plurality of nodes may be indicated as intended recipients of the message, whereby a message may be targeted at selected nodes among the plurality of nodes.

7. A method for messaging within a plurality of nodes as set forth in claim 6, wherein the multiple nodes among the plurality nodes near the node to which the message is intended to be sent may also be indicated as intended recipients of the message, whereby the selected nodes cover an area within the plurality of nodes.

8. A method for messaging within a plurality of nodes as set forth in claim 1, wherein in the step of re-transmitting the message, the message is re-transmitted only in a subset of directions determined from the address code in the message and the direction from which the message was received.

9. A method for messaging within a plurality of nodes as set forth in claim 1, wherein the in the step of re-transmitting the message, the message is re-

transmitted only in directions which result in re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message always occurs toward the intended recipient.

10. A method for messaging within a plurality of nodes as set forth in claim 1, further including the optional step of modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient.

11. A method for messaging within a plurality of nodes as set forth in claim 10, wherein a portion of the nodes include at least one sensor for generating sensor information, and wherein in the step of modifying the data, sensor information may be used to modify the data of the message prior to re-transmission.

12. A method for messaging within a plurality of nodes as set forth in claim 11, wherein when the message reaches the node to which the message is intended to be sent, a step of designating a new node to which the message is intended to be sent and wherein the message is propagated to the new node by repeating steps a-e, whereby a message may be sequentially transmitted to multiple intended recipients.

13. A method for messaging within a plurality of nodes as set forth in claim 12, wherein each time the message reaches a node to which the message is intended

to be sent, a step of modifying the address code of the message to indicate a new node to which the message is intended to be sent is performed, and an optional step modifying the data of the message may be performed.

14. A method for messaging within a plurality of nodes as set forth in claim 1, wherein the re-transmitting of the message across the plurality of nodes occurs in a two-dimensional plane.

15. A method for messaging within a plurality of nodes as set forth in claim 14, wherein each of the nodes transmits and receives in four possible directions.

16. A method for messaging within a plurality of nodes as set forth in claim 15, wherein the four possible directions are at 90 degree angles to each other and wherein a message is received from a direction represented by (X, Y), and wherein the address code is modified in the modifying step such that when it is:

a. transmitted 90 degrees to the left of the direction in which it is received, the modified address code is (Y, X+1);
b. transmitted along the same direction in which it is received, the modified address code is (X, Y-1); and
c. transmitted 90 degrees to the right of the direction in which it is received, the modified address code is (-Y, X-1).

17. A method for messaging within a plurality of nodes as set forth in claim 16, further including a step of time-stamping the message when it is initially transmitted, and a step of comparing the time-stamp to a current time at each node prior to re-transmission, a step of halting the re-transmitting of the message after a predetermined amount of time has elapsed since the step of time-stamping the message occurred, whereby a messages propagate through the plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

18. A method for messaging within a plurality of nodes as set forth in claim 16, further including a step of initializing a cumulative hop count in the message when it is initially transmitted, a step of incrementing or decrementing the hop-count each time the message is re-transmitted, and a step of halting the re-transmission of the message when the hop-count reaches a predetermined level, whereby messages propagate through the plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

19. A method for messaging within a plurality of nodes as set forth in claim 16, further including a step of providing a unique identifier in the message when it is initially transmitted, a step of checking and recording the unique identifier of the message at each node to determine whether the unique identifier of the message matches one previously stored, and a step of halting the re-transmission of the

message if the unique identifier of the message matches one previously stored, whereby the messages propagate through the plurality of nodes only once.

20. A method for messaging within a plurality of nodes as set forth in claim 16, wherein multiple nodes among the plurality of nodes may be indicated as intended recipients of the message, whereby a message may be targeted at selected nodes among the plurality of nodes.

21. A method for messaging within a plurality of nodes as set forth in claim 17, wherein the multiple nodes among the plurality nodes near the node to which the message is intended to be sent may also be indicated as intended recipients of the message, whereby the selected nodes cover an area within the plurality of nodes.

22. A method for messaging within a plurality of nodes as set forth in claim 16, wherein in the step of re-transmitting the message, the message is re-transmitted only in a subset of directions determined from the address code in the message and the direction from which the message was received.

23. A method for messaging within a plurality of nodes as set forth in claim 16, wherein the in the step of re-transmitting the message, the message is re-transmitted only in directions which result in re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message always occurs toward the intended recipient.

24. A method for messaging within a plurality of nodes as set forth in claim 16, further including the optional step of modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient.

25. A method for messaging within a plurality of nodes as set forth in claim 24, wherein a portion of the nodes include at least one sensor for generating sensor information, and wherein in the step of modifying the data, sensor information may be used to modify the data of the message prior to re-transmission.

26. A method for messaging within a plurality of nodes as set forth in claim 25, wherein when the message reaches the node to which the message is intended to be sent, a step of designating a new node to which the message is intended to be sent and wherein the message is propagated to the new node by repeating steps a-e, whereby a message may be sequentially transmitted to multiple intended recipients.

27. A method for messaging within a plurality of nodes as set forth in claim 16, wherein the data of the message is a command.

28. A method for messaging within a plurality of nodes as set forth in claim 16, where at least a portion of the nodes is mobile.

29. A method for messaging within a plurality of nodes as set forth in claim 1, wherein the re-transmitting of the message across the plurality of nodes occurs in a three-dimensional volume.

30. A system for directed communication within a data network, the network comprising a plurality of nodes, each comprising a processor, a memory connected with the processor, and a directional communication interface connected with the processor, the processor and memory include:

a. means for receiving a message via the communication interface and providing the message to the processor and memory, the message including an address code and corresponding data, the address code including a relative target address of a node to which the corresponding message is intended to be sent;

b. means for determining if the address code indicates that the node receiving the message is the intended recipient of the message;

c. means for modifying the message based on the direction from which the message was received, the address code in the message, and the direction to which the message is to be re-transmitted;

d. means re-transmitting the message via the directional communication interface, including the modified address code, in each direction in which it is to be re-transmitted; whereby a message may be propagated across the plurality of nodes until the message reaches the node to which the message

is intended to be sent, and a message may be propagated across a plurality of nodes along multiple paths until the message reaches a desired recipient, thereby providing path redundancy without the need for the use of unique node identities.

31. A system for directed communication within a data network as set forth in claim 30, wherein the processor and memory of each node further include a means for of expiring the message to prevent its re-transmission.

32. A system for directed communication within a data network as set forth in claim 30, wherein the processor and memory of each node further include a means for time-stamping the message when it is initially transmitted, a means for comparing the time-stamp to a current time at each node prior to re-transmission, and a means for halting the re-transmitting of the message after a predetermined amount of time has elapsed since the time-stamping of the message occurred, whereby messages propagate through the plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

33. A system for directed communication within a data network as set forth in claim 30, wherein the processor and memory of each node further include a means for initializing a cumulative hop count in the message when it is initially transmitted, a means for incrementing or decrementing the hop-count each time the message is

re-transmitted, and a means for halting the re-transmission of the message when the hop-count reaches a predetermined level, whereby messages propagate through the plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

34. A system for directed communication within a data network as set forth in claim 30, wherein the processor and memory of each node further include a means for providing a unique identifier for the message when it is initially transmitted, a means for checking and recording the unique identifier of the message at each node to determine whether the unique identifier of the message matches one previously stored, and a means for halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through the plurality of nodes only once.

35. A system for directed communication within a data network as set forth in claim 30, wherein multiple nodes among the plurality of nodes may be indicated as intended recipients of the message, whereby a message may be targeted at selected nodes among the plurality of nodes.

36. A system for directed communication within a data network as set forth in claim 35, wherein the multiple nodes among the plurality nodes near the node to which the message is intended to be sent may also be indicated as intended recipients of

the message, whereby the selected nodes cover an area within the plurality of nodes.

37. A system for directed communication within a data network as set forth in claim 30, wherein the means for re-transmitting the message enables the message to be only in directions determined from the address code in the message.

38. A system for directed communication within a data network as set forth in claim 30, wherein the means for re-transmitting the message causes the message to be re-transmitted only in directions which result in re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message always occurs toward the intended recipient.

39. A system for directed communication within a data network as set forth in claim 30, wherein the processor and memory of each node further include a means for modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient.

40. A system for directed communication within a data network as set forth in claim 39, wherein a portion of the nodes include at least one sensor for generating sensor information, and wherein the means for modifying the data uses the sensor information to modify the data of the message prior to re-transmission.

41. A system for directed communication within a data network as set forth in claim 40, wherein when the message reaches the node to which the message is intended to be sent, a new node may be designated as the node to which the message is intended to be sent, and wherein the message is propagated to the new node, whereby a message may be sequentially transmitted to multiple intended recipients.

42. A system for directed communication within a data network as set forth in claim 41, wherein each time the message reaches a node to which the message is intended to be sent, the address code of the message is modified by the processor of the node to indicate a new node to which the message is intended to be sent is performed.

43. A system for directed communication within a data network as set forth in claim 30, wherein the nodes are configured to re-transmit the message in a two-dimensional plane.

44. A system for directed communication within a data network as set forth in claim 43, wherein each of the nodes is configured to transmit and receive in four possible directions.

45. A system for directed communication within a data network as set forth in claim 43, wherein the four possible directions are at 90 degree angles to each other and

wherein a message is received from a direction represented by (X, Y), and wherein the address code is modified by the means for modifying such that when it is:

a. transmitted 90 degrees to the left of the direction in which it is received, the modified address code is (Y, X+1);

b. transmitted along the same direction in which it is received, the modified address code is (X, Y-1); and

c. transmitted 90 degrees to the right of the direction in which it is received, the modified address code is (-Y, X-1).

46. A system for directed communication within a data network as set forth in claim 45, wherein the processor and memory of each node further include a means for time-stamping the message when it is initially transmitted, a means for comparing the time-stamp to a current time at each node prior to re-transmission, and a means for halting the re-transmitting of the message after a predetermined amount of time has elapsed since the time-stamping of the message occurred, whereby messages propagate through the plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

47. A system for directed communication within a data network as set forth in claim 45, wherein the processor and memory of each node further include a means for

initializing a cumulative hop count in the message when it is initially transmitted, a means for incrementing or decrementing the hop-count each time the message is re-transmitted, and a means for halting the re-transmission of the message when the hop-count reaches a predetermined level, whereby messages propagate through the plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

48. A system for directed communication within a data network as set forth in claim 45, wherein the processor and memory of each node further include a means for providing a unique identifier for the message when it is initially transmitted, a means for checking and recording the unique identifier of the message at each node to determine whether the unique identifier of the message matches one previously stored, and a means for halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through the plurality of nodes only once.

49. A system for directed communication within a data network as set forth in claim 45, wherein multiple nodes among the plurality of nodes may be indicated as intended recipients of the message, whereby a message may be targeted at selected nodes among the plurality of nodes.

50. A system for directed communication within a data network as set forth in claim 49, wherein the multiple nodes among the plurality nodes near the node to which the message is intended to be sent may also be indicated as intended recipients of the message, whereby the selected nodes cover an area within the plurality of nodes.

51. A system for directed communication within a data network as set forth in claim 45, wherein when the message is re-transmitted, it is re-transmitted only in directions determined from the address code in the message.

52. A system for directed communication within a data network as set forth in claim 45, the message is re-transmitted through the plurality of nodes only in directions which result in re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message always occurs toward the intended recipient.

53. A system for directed communication within a data network as set forth in claim 39, wherein a portion of the nodes include at least one sensor for generating sensor information, and wherein the means for modifying the data uses the sensor information to modify the data of the message prior to re-transmission.

54. A system for directed communication within a data network as set forth in claim 40, wherein when the message reaches the node to which the message is intended

to be sent, a new node may be designated as the node to which the message is intended to be sent, and wherein the message is propagated to the new node, whereby a message may be sequentially transmitted to multiple intended recipients.

55. A system for directed communication within a data network as set forth in claim 41, wherein each time the message reaches a node to which the message is intended to be sent, the address code of the message is modified by the processor of the node to indicate a new node to which the message is intended to be sent is performed.

56. A system for directed communication within a data network as set forth in claim 45, wherein the data of the messages are commands.

57. A system for directed communication within a data network as set forth in claim 45, wherein at least a portion of the nodes is mobile.

58. A system for directed communication within a data network as set forth in claim 30, wherein the re-transmitting of the message across the plurality of nodes occurs in a three-dimensional volume.

59. A node for communication within a system for directed communication within a data network, the node comprising a processor, a memory connected with the processor, and a directional communication interface connected with the processor, the processor and memory include:

a. means for receiving a message via the communication interface and providing the message to the processor and memory, the message including an address code and corresponding data, the address code including a relative target address of a node to which the corresponding message is intended to be sent;

b. means for determining if the address code indicates that the node receiving the message is the intended recipient of the message;

c. means for modifying the message based on the direction from which the message was received, the address code in the message, and the direction to which the message is to be re-transmitted;

d. means re-transmitting the message via the directional communication interface, including the modified address code, in each direction in which it is to be re-transmitted; whereby a message may be propagated across the plurality of nodes until the message reaches the node to which the message is intended to be sent, and a message may be propagated across a plurality of nodes along multiple paths until the message reaches a desired recipient, thereby providing path redundancy without the need for the use of unique node identities.

60. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory of the node further includes a means for expiring the message to prevent its re-transmission.

61. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory of the node further includes a means for time-stamping the message if it is initially transmitted from that node, a means for comparing the time-stamp to a current time at each node prior to re-transmission, and a means for halting the re-transmitting of the message if a predetermined amount of time has elapsed since the time-stamping of the message occurred, whereby messages can propagate through a plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

62. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory the node further includes a means for initializing a cumulative hop count in the message when it is initially transmitted from that node, a means for incrementing or decrementing the hop-count each time a message is re-transmitted from the node, and a means for halting the re-transmission of the message when the hop-count reaches a predetermined level at the node, whereby messages propagate through a

plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

63. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory, the node further includes a means for providing a unique identifier for the message when it is initially transmitted, a means for checking and recording the unique identifier of the message at the node to determine whether the unique identifier of the message matches one previously stored, and a means for halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through a plurality of nodes only once.

64. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the means for re-transmitting the message enables the message to be only in a subset of directions determined from the address code in the message and the direction from which the message was received.

65. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the means for re-transmitting the message causes the message to be re-transmitted only in directions which result in

re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message within a plurality of the nodes always occurs toward the intended recipient.

66. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory of the node further includes a means for modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient node across a plurality of nodes.

67. A node for communication within a system for directed communication within a data network as set forth in claim 66, wherein the node includes at least one sensor for generating sensor information, and wherein the means for modifying the data uses the sensor information to modify the data of the message prior to re-transmission.

68. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the node is configured to re-transmit the message in a two-dimensional plane.

69. A node for communication within a system for directed communication within a data network as set forth in claim 68,wherein the node is configured to transmit and receive in four possible directions.

70. A node for communication within a system for directed communication within a data network as set forth in claim 69, wherein the four possible directions are at 90 degree angles to each other and wherein a message is received from a direction represented by (X, Y), and wherein the address code is modified by the means for modifying such that when it is:

a. transmitted 90 degrees to the left of the direction in which it is received, the modified address code is (Y, X+1);
b. transmitted along the same direction in which it is received, the modified address code is (X, Y-1); and
c. transmitted 90 degrees to the right of the direction in which it is received, the modified address code is (-Y, X-1).

71. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory of the node further includes a means for time-stamping the message if it is initially transmitted from that node, a means for comparing the time-stamp to a current time at each node prior to re-transmission, and a means for halting the re-transmitting of the message if a predetermined amount of time has elapsed since the time-stamping of the message occurred, whereby messages can propagate through a plurality of nodes for a pre-specified amount of time and then are no-

longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

72. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory the node further includes a means for initializing a cumulative hop count in the message when it is initially transmitted from that node, a means for incrementing or decrementing the hop-count each time a message is re-transmitted from the node, and a means for halting the re-transmission of the message when the hop-count reaches a predetermined level at the node, whereby messages propagate through a plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

73. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the processor and memory, the node further includes a means for providing a unique identifier for the message when it is initially transmitted, a means for checking and recording the unique identifier of the message at the node to determine whether the unique identifier of the message matches one previously stored, and a means for halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through a plurality of nodes only once.

74. A node for communication within a system for directed communication within a data network as set forth in claim 70, wherein when the message is re-transmitted, it is re-transmitted only in a subset of directions determined from the address code in the message and the direction from which the message was received.

75. A node for communication within a system for directed communication within a data network as set forth in claim 70, wherein when the message is re-transmitted boy the node, it is only re-transmitted in directions which result in re-transmission toward a node to which the message is intended to be sent, whereby the propagation of the message always occurs toward an intended recipient.

76. A node for communication within a system for directed communication within a data network as set forth in claim 70, wherein the processor and memory of the node further includes a means for modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient node across a plurality of nodes.

77. A node for communication within a system for directed communication within a data network as set forth in claim 70, wherein the data of the messages are commands.

78. A node for communication within a system for directed communication within a data network as set forth in claim 70, wherein the node is mobile.

79. A node for communication within a system for directed communication within a data network as set forth in claim 59, wherein the node is configured to transmit along multiple directions in a three-dimensional volume.

80. A computer program product for facilitating messaging within a plurality of nodes, with each node having a processor, a memory connected with the processor, and a directional communication interface, the computer program product comprising:

a. a recording medium;

b. means, recorded on the recording medium for facilitating reception of a message via the communication interface and providing the message to the processor and memory, the message including an address code and corresponding data, the address code including a relative target address of a node to which the corresponding message is intended to be sent;

c. means, recorded on the recording medium for facilitating determination whether the address code in a received message indicates that the node receiving the message is the intended recipient of the message;

d. means, recorded on the recording medium for modifying the message based on the direction from which the message was received, the address

code in the message, and the direction to which the message is to be re-transmitted; and

e. means, recorded on the recording medium for facilitating the re-transmission of the message via the directional communication interface, including the modified address code, in each direction in which it is to be re-transmitted; whereby a message may be propagated across the plurality of nodes until the message reaches the node to which the message is intended to be sent, and a message may be propagated across a plurality of nodes along multiple paths until the message reaches a desired recipient, thereby providing path redundancy without the need for the use of unique node identities.

81. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, further including means, recorded on the recording medium, for expiring the message to prevent its re-transmission.

82. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, further including means, recorded on the recording medium, for time-stamping the message if it is initially transmitted from that node; means, recorded on the recording medium, for comparing the time-stamp to a current time at each node prior to re-transmission; and means, recorded on the recording medium, for halting the re-transmitting of the message if a predetermined amount of time has elapsed since the time-stamping of the message

occurred, whereby messages can propagate through a plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

83. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, further including means, recorded on the recording medium, for initializing a cumulative hop count in the message when it is initially transmitted from that node; means, recorded on the recording medium, for incrementing or decrementing the hop-count each time a message is re-transmitted from the node; and means, recorded on the recording medium, for halting the re-transmission of the message when the hop-count reaches a predetermined level at the node, whereby messages propagate through a plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

84. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, further including means, recorded on the recording medium, for providing a unique identifier for the message when it is initially transmitted; means, recorded on the recording medium, for checking and recording the unique identifier of the message at the node and determining whether the unique identifier of the message matches one previously stored; and means, recorded on the recording medium, for halting the re-transmission of the

message if the unique identifier of the message matches one previously stored, whereby the messages propagate through a plurality of nodes only once.

85. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, wherein the means for facilitating the re-transmission of the message enables the message to be transmitted only in a subset of directions determined from the address code in the message and the direction from which the message was received.

86. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, wherein the means for re-transmitting the message causes the message to be re-transmitted only in directions which result in re-transmission toward the node to which the message is intended to be sent, whereby the propagation of the message within a plurality of the nodes always occurs toward the intended recipient.

87. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, further including means, recorded on the recording medium, for modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient node across a plurality of nodes.

88. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 87, wherein the means for modifying the data uses sensor information to modify the data of the message prior to re-transmission.

89. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 80, wherein the computer program product is designed to facilitate message transmission and reception in four possible directions at 90 degree angles to each other and wherein a message is received from a direction represented by (X, Y), and wherein the address code is modified by the means for modifying such that when it is:

a. transmitted 90 degrees to the left of the direction in which it is received, the modified address code is (Y, X+1);
b. transmitted along the same direction in which it is received, the modified address code is (X, Y-1); and
c. transmitted 90 degrees to the right of the direction in which it is received, the modified address code is (-Y, X-1).

90. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, further including means, recorded on the recording medium, for time-stamping the message if it is initially transmitted from that node; means, recorded on the recording medium, for comparing the time-stamp to

a current time at each node prior to re-transmission; and means, recorded on the recording medium, for halting the re-transmitting of the message if a predetermined amount of time has elapsed since the time-stamping of the message occurred, whereby messages can propagate through a plurality of nodes for a pre-specified amount of time and then are no-longer re-transmitted regardless of whether they reach the node to which they were intended to be sent.

91. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, further including means, recorded on the recording medium, for initializing a cumulative hop count in the message when it is initially transmitted from that node; means, recorded on the recording medium, for incrementing or decrementing the hop-count each time a message is re-transmitted from the node; and means, recorded on the recording medium, for halting the re-transmission of the message when the hop-count reaches a predetermined level at the node, whereby messages propagate through a plurality of nodes for a pre-specified number of hops and then are no-longer re-transmitted regardless whether they reach the node to which they were intended to be sent.

92. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, further including means, recorded on the recording medium, for providing a unique identifier for the message when it is initially transmitted; means, recorded on the recording medium, for checking and recording the unique identifier of the message at the node and determining

whether the unique identifier of the message matches one previously stored; and means, recorded on the recording medium, for halting the re-transmission of the message if the unique identifier of the message matches one previously stored, whereby the messages propagate through a plurality of nodes only once.

93. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, wherein the means for facilitating the re-transmission of the message enables the message to be transmitted only in a subset of directions determined from the address code in the message and the direction from which the message was received.

94. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, further including means, recorded on the recording medium, for ensuring that when the message is re-transmitted, it is re-transmitted only in directions determined from the address code in the message.

95. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, further including means, recorded on the recording medium, for modifying the data of the message at a node prior to re-transmission, whereby the message may accumulate information as it propagates to the intended recipient node across a plurality of nodes.

96. A computer program product for facilitating messaging within a plurality of nodes as set forth in claim 89, wherein the data of the messages are commands.